

## Japanese Spiders of the Genus *Eriophora* (Araneae: Araneidae)

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**Abstract** — Three Japanese spider species, which have been placed in the genus *Zilla*, are moved to the genus *Eriophora*, based on cladistic analysis. Three known species, *Eriophora sagana* (Bösenberg & Strand 1906) comb. nov., *E. sachalinensis* (S. Saito 1934) comb. nov., and *E. aurea* (S. Saito 1934) comb. nov. are redescribed and one new species, *E. yanbaruensis* sp. nov., is described from Okinawajima Island, Japan. On the other hand, *Aranea sagana* Bösenberg & Strand 1906 is revived from a homonym of *Aranea sagana* (Keyserling 1893). *Eriophora migra* Zhu & Song 1994 is newly synonymized with *Eriophora sagana* (Bösenberg & Strand 1906) comb. nov. and *Eriophora flava* Zhu & Song 1994 is newly synonymized with *Eriophora sachalinensis* (S. Saito 1934) comb. nov.

**Key words** — Araneidae, *Eriophora aurea*, *Eriophora sachalinensis*, *Eriophora sagana*, *Eriophora yanbaruensis*, new species, new synonymy

Three species of *Zilla* have been known from Japan, that is, *Z. astridae* Strand 1917, *Z. sachalinensis* (S. Saito 1934), and *Z. aurea* (S. Saito 1934). In the spring of 1997, I collected several specimens of a unique spider closely resembled *Zilla sachalinensis* (S. Saito 1934) at Okinawajima Island, southwestern part of Japan. I began to reexamine the spiders of the genus *Zilla* to clarify the taxonomic position of the spider found in Okinawa and other Japanese species in the genus *Zilla*. First, I examined the specimens of the type species *Zilla diodia* (Walckenaer 1802) known from Europe. Although the Japanese species resemble *Zilla diodia* in the general appearance, the male palp of *Z. diodia* has a subterminal apophysis which Japanese species does not have (Figs. 2–4). Moreover the male palp of Japanese species has a paramedian apophysis which *Z. diodia* does not have (Figs. 2–4). These differences between Japanese species and *Z. diodia* suggest that the placement of the Japanese species in the genus *Zilla* is problematical. Judging from the features of the male palp, the Japanese species in question could be placed in *Eriophora*, because the male palp of *Eriophora* has a paramedian apophysis and does not have a subterminal apophysis. However, some differences have been found between the Japanese species and *Eriophora*: 1) the male second tibia is sinuate in *Eriophora* but straight in Japanese species, 2) the scape of the epigynum is elongated in *Eriophora*, but not in Japanese species except *astridae*, 3) the scape is wrinkled in *Eriophora* but not in Japanese species, 4) median ocular area wider in front than behind in *Eriophora*, but wider behind in the Japanese species except *aurea*. Consequently it seems difficult to determine the taxonomic position of the Japanese species without performing cladistic analysis involving *Zilla*, *Eriophora* and other related genera. The questions addressed in this paper are 1) whether the Japanese species in question form the monophyletic group, 2) whether they form the monophyletic group with *Eriophora* or *Zilla* or other genus.

All the type specimens designated in this paper are deposited in the collection of the Zoological Department of National Science Museum, Tokyo.

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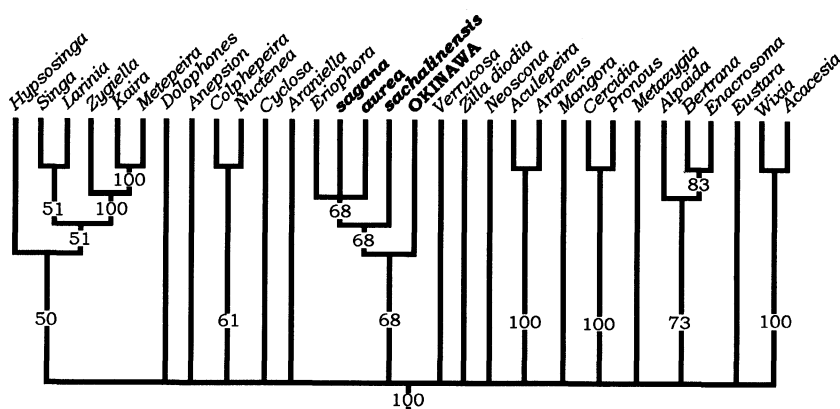
### Cladistic analysis

**Methods:** I added the data of *Zilla diodia*, *Z. sagana* (= *astridae*), *Z. sachalinensis*, *Z. aurea*, and undescribed species from Okinawa to Scharff and Coddington's (1997) data matrix. The data of these species are shown in Table 1. For the analysis, I used PAUP version 3.1.1 for Macintosh (Swofford 1993) on Mac OS 7.6.1 and PAUP version 4.0b2 for Windows (Swofford 1998) on Windows 98 4.10. I used the heuristic search method and chose the closest addition strategy and TBR branch swapping according to Scharff and Coddington (1997). Multistate characters were treated as unordered and all the characters were equally weighted.

**Results:** Both PAUP 3.1.1 and PAUP 4.0b2 found 25056 trees of 289 steps. After using the filter "keep a tree only if more highly resolved compatible trees do not exist", 3824 trees remained. Because many trees were obtained, I constructed the majority-rule consensus tree and compare it with Scharff and Coddington's tree (1997, fig. 82). In the majority-rule consensus tree, the topology of "terminal apophysis clade" was collapsed but the other part was completely compatible with Scharff and Coddington's tree. The part of the "terminal apophysis clade" in the majority-rule consensus tree is shown in Fig. 1. Although many genera of the "terminal apophysis clade" were polytomous in the consensus tree, all the Japanese species formed a monophyletic group with *Eriophora*, but *Zilla diodia* did not belong to this clade (Fig. 1). Consequently, it appears that the Japanese species, previously placed in the genus *Zilla* as well as unknown species from

**Table 1.** Data of the four Japanese species and *Zilla diodia* used for cladistic analysis. Okinawa is an unknown species from Okinawajima. As for the characters, see Scharff & Coddington (1997).

Species	Upper line characters 1–60, lower line characters 61–82.
<i>sagana</i>	01111100000000011110–10000011000110010110000100000110000–000
<i>sachalinensis</i>	01111100000000011110–10000010000110010110000100000110000–000
<i>aurea</i>	01111100000000011110–1000001000011001011000010001000110000–000
Okinawa	00111100000000011110–10000010000110010110000100000110000–000
<i>Zilla diodia</i>	00111100000000011011010000010000110000110000100000110000–000
	00010001?0??010?0?00?0
	00010001?0??010?0?00?0
	00010001?0??010?0?00?0
	00010001?0??010?0?00?0
	00010001?0??010?0?00?0



**Fig. 1.** The part of “Terminal apophysis clade” in the majority-rule consensus tree. Boldface means Japanese species. Numbers mean frequency of each clade.

Okinawa, should be placed in the genus *Eriophora* rather than *Zilla*.

### Descriptions

Family Araneidae

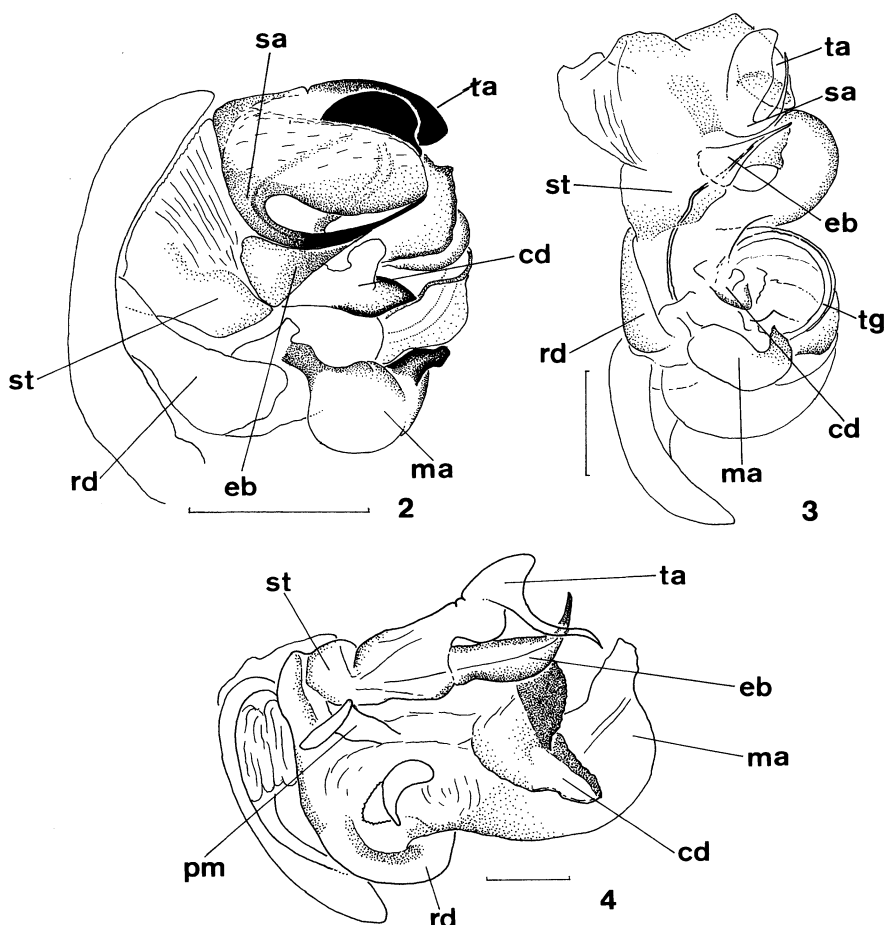
Genus *Eriophora*

*Eriophora* Simon 1864, p. 261. Type species *Epeira ravilla* C. L. Koch 1845 designated by F.O. P.-Cambridge 1903; Levi 1970, p. 282; Yin et al. 1997, p. 288.

**Diagnosis.** Spiders of the genus *Eriophora* can be separated from those of the genus *Araneus* or other members of Araneinae by 1) the presence of the male palpal paramedian apophysis (Fig. 4), 2) the absence of the male palpal subterminal apophysis, and 3) the presence of more than two trichobothria on metatarsus IV.

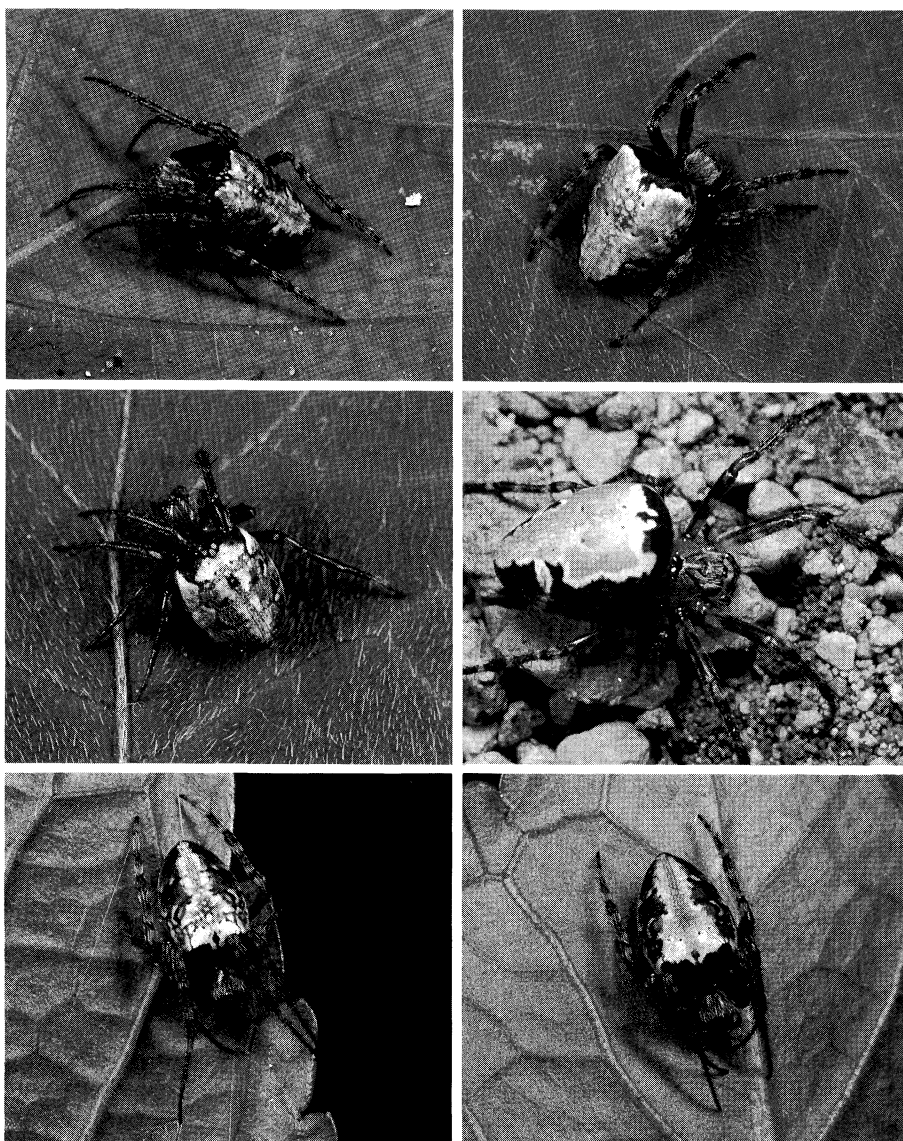
### Key to the Japanese species

1. Female .....2.
- Male .....5.
2. If exist, scape of epigynum very long (more than two times of the width of the epigynum; Fig. 11); if scape torn off, epigynum as in Fig. 14.....*Eriophora sagana* (Bösenberg & Strand 1906).
- If exist, scape of epigynum not so long (slightly longer than the length of the basal part of epigynum); if scape torn off, epigynum otherwise .....3.
3. The ratio of epigynal scape width to epigynum width more than 1/2 as in Fig. 19 .....*Eriophora aurea* (S. Saito 1934)
- The ratio of epigynal scape width to epigynum width less than 1/2 as in Figs. 16, 23 .....4.
4. In ventral view, epigynum widest at the frontal part as in Fig. 16.....*Eriophora sachalinensis* (S. Saito 1934)
- In ventral view, epigynum widest at around the middle part as in Fig. 23 .....*Eriophora yanbaruensis* sp. nov.



**Figs. 2-4.** 2-3, *Zilla diodia* Walckenaer 1802 — 2, Male left palp prolateral view; 3, same, expanded. 4, *Eriophora sagana* (Bösenberg & Strand 1906) — 4, male left palp, expanded. (Scales: 0.25 mm; cd: conductor, eb: embolus, ma: median apophysis, pm: paramedian apophysis, rd: radix, sa: subterminal apophysis, st: stipes, ta: terminal apophysis, tg: tegulum.)

5. Median apophysis distally widened as in Fig. 15 ..... *Eriophora sachalinensis* (S. Saito 1934)
- Median apophysis distally becomes narrow as in Figs. 12, 18, 22 ..... 6.
6. Embolus large and rostriform and terminal apophysis strong as in Fig. 12 ..... *Eriophora sagana* (Bösenberg & Strand 1906)
- Embolus not so large, terminal apophysis weak as in Figs. 18, 22 ..... 7.
7. Terminal apophysis like a fine thread as in Fig. 22 ..... *Eriophora yanbaruensis* sp. nov.
- Terminal apophysis spiniform as in Fig. 18 .... *Eriophora aurea* (S. Saito 1934)



**Figs. 5–10.** 5(upper left), *Eriophora sagana* (Bösenberg & Strand 1906), female on a leaf; 6(upper right), same, another female on a leaf; 7(middle left), *Eriophora sachalinensis* (S. Saito 1934), female on a leaf; 8 (middle right), *Eriophora aurea* (S. Saito 1934), female dropped on the ground, one of the color variations; 9 (bottom left), *Eriophora yanbaruensis* sp. nov., female on a leaf; 10 (bottom right), same, another female on a leaf.

***Eriophora sagana* (Bösenberg & Strand 1906), comb. nov.**

[Japanese name: Saga-onigumo]

(Figs. 4, 5-6, 11-14)

*Aranea sagana* Bösenberg & Strand 1906, p. 233, pl. 11, figs. 212 (female holotype from "Yunohama-Berge", Saga, Japan, preserved in Senckenberg Museum, Frankfurt, not examined).

*Aranea astridae* Strand 1917, p. 71 (nom. nov. for *Aranea sagana* Bösenberg & Strand 1906). **SYN. NOV.**

*Zilla sagana*: Yaginuma 1955, p. 21, pl. 2, figs. 1-7.

*Zilla astridae*: Shinkai & Takano 1984, p. 72; Yaginuma 1986, p. 106; Chikuni 1989, pp. 74, 211, fig. 37; Yin et al. 1997, p. 397, fig. 287.

*Eriophora migra* Zhu & Song 1994, p. 40, fig. 15 (male holotype from Badong County, not examined); Yin et al. 1997, p. 289. **SYN. NOV.**

*Specimens examined.* Specimens measured. 1 ♀, Kori, Okutama-machi, Tokyo, 10-V-1981, A. Tanikawa leg. (NSMT-Ar 4403); 2 ♀, Yokozawa, Itsukaichi-shi, Tokyo, 17-V-1992, A. Tanikawa leg. (NSMT-Ar 4404); 1 ♀, Mt. Takao, Hachioji-shi, Tokyo, 15-V-1983, A. Tanikawa leg. (NSMT-Ar 4405); 1 ♂, Sagamiko Lake, Sagami-hiko-machi, Kanagawa Prefecture, N. Tanaka leg. (NSMT-Ar 4406); 1 ♂, Yushin, Tanzawa, Kanagawa Prefecture, 27-V-1976, K. Kumada leg. (NSMT-Ar 4407); 1 ♂, Yamakita-machi, Ashigarakami-gun, Kanagawa Prefecture, 27-V-1976, K. Kumada leg. (NSMT-Ar 4408); 1 ♂, Sakurayama, Zushi-shi, Kanagawa Prefecture, 7-V-1994, T. Kimura leg. (NSMT-Ar 4409); 1 ♀, Kiwa-cho, Minami-muro-gun, Mie Prefecture, 3-VIII-1991, A. Tanikawa leg. (NSMT-Ar 4410); 1 ♂, Ishinami, Kushima-shi, Miyazaki Prefecture, 26-IV-1993, C. Okuma leg. (NSMT-Ar 4410).

Other specimens examined. 38 ♀ 2 ♂ from Miyagi, Tochigi, Tokyo, Kanagawa, Mie, Ehime, Miyazaki, and Okinawa Prefectures.

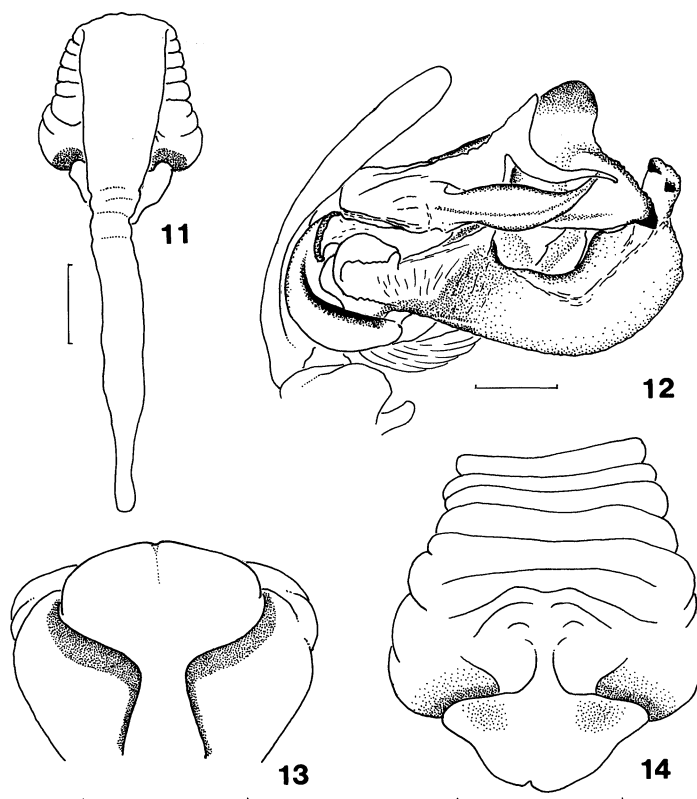
*Description.* Measurement (in mm). Total length ♀ 6.20-9.80, ♂ 4.40-4.83. Carapace length ♀ 2.53-3.17, ♂ 2.35-2.63; width ♀ 2.13-2.77, ♂ 1.93-2.19. Length of legs (1 ♀ from Tokyo/1 ♂ from Kanagawa): I, 11.50/10.29; II, 10.42/9.00; III, 6.14/5.28; IV, 9.78/8.06. Abdomen length ♀ 4.25-6.60, ♂ 2.30-2.86; width ♀ 3.03-5.27, ♂ 1.58-1.80.

Female and male. Carapace length/width ♀ 1.14-1.20, ♂ 1.19-1.22. Median ocular area length/width ♀ 0.88-0.97, ♂ 0.84-1.00; anterior width/posterior width ♀ 0.96-1.07, ♂ 0.96-1.08. Chelicera with 4 promarginal and 3 retromarginal teeth. Labium length/width ♀ 0.71-0.76, ♂ 0.59-0.72. Sternum length/width ♀ 1.09-1.15, ♂ 1.15-1.29. Length of leg I/length of carapace ♀ 3.68-4.09, ♂ 3.88-4.05. Male palp as in Figs. 4, 12. Abdomen length/width ♀ 1.25-1.44, ♂ 1.36-1.61, anteriorly with a pair of shoulder hump (Figs. 5-6). Epigynum as in Figs. 11, 14, scape very long.

Coloration and markings in alcohol. Female and male. Carapace pale brown, head region darker. Legs brown, with dark brown annulations. Abdomen dark brown, mottled with black and pale yellow or white.

*Range.* Japan, China and Korea.

*Remarks.* This species was first described as *Aranea sagana* by Bösenberg and Strand (1906). On the other hand, *Epeira sagana* was described from Brasil by Keyserling (1893). On the basis of the synonymy between *Epeira* and *Aranea*, Strand (1917) regarded the Japanese species as a junior homonym of the American one and gave a new name *Aranea astridae* Strand 1917 for the former. Besides, he overlooked that Keyserling's *Aranea sagana* was already transferred to *Araneus* by Petrunkevitch (1911). Strand's treatment on homonymy was based only on the nominal collation, and both the species were in fact not congeneric (H. Ono, pers. com.). From this viewpoint *Aranea sagana* Bösenberg & Strand 1906 is revived from a homonym of *Aranea sagana* (Keyserling 1893) [= *Araneus saganus* (Keyserling 1893)], and redescribed herein as a



**Figs. 11–14.** *Eriophora sagana* (Bösenberg & Strand 1906) — 11, Epigynum with scape, ventral view (NSMT-Ar 4404); 12, male left palp, prolateral view (NSMT-Ar 4408); 13, epigynum, posterior view (NSMT-Ar 4404); 14, epigynum, scape torn off, ventral view (NSMT-Ar 4404). (Scales: 0.25 mm.)

member of the genus *Eriophora*.

*E. sagana* can be easily separated from the other Japanese species of the genus *Eriophora* by the following points. In female, scape of epigynum is much longer than the other species (Figs. 11, 15, 19, 23), even if scape is torn off, the shape of the epigynum is quite different from those of the other species (Figs. 14, 21, 25). In male, palpal embolus and terminal apophysis are much larger and stronger than those of the other species (Figs. 12, 15, 18, 22).

***Eriophora sachalinensis* (S. Saito 1934), comb. nov.**

[Japanese name: Karafuto-onigumo]

(Figs. 7, 15–17)

*Argiope sachalinensis* S. Saito 1934a, p. 332 (female holotype from Sakhaline, lost).

*Araneus tokachianus* S. Saito 1934b, p. 326, pl. 13, fig. 22, pl. 15, fig. 65 (female holotype from Mt. Tokachi-dake, lost; synonymized by Yaginuma 1986.).

*Zilla sachalinensis*: Yaginuma 1955, p. 21, pl. 2, figs. 8–12; Shinkai & Takano 1984, p. 73; Yaginuma

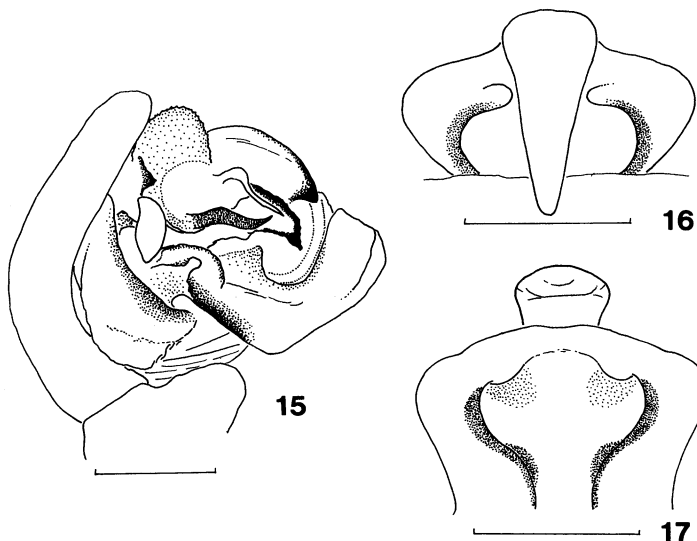
1986, p. 105, pl. 26, figs. 4, 56; Chikuni 1989, pp. 74, 211, fig. 36; Yin et al. 1997, p. 402, fig. 292.  
*Zilla tokachiana*: Yaginuma 1955, p. 21.  
*Zilla flavomaculata* Yaginuma 1955, p. 22, pl. 2, figs. 13–20 (female holotype from Mie Prefecture, preserved in Arachnological Society of Japan, not examined).  
*Eriophora flava* Zhu & Song 1994, p. 37, fig. 12 (male holotype from Mt. Jianfengling, Hainan Province, China, not examined); Yin et al. 1997, p. 288. **SYN. NOV.**

**Specimens examined.** Specimens measured. 1 ♂, Maruyama, Sapporo-shi, Hokkaido, 19–VI–1981, N. Tsurusaki leg. (NSMT–Ar 4412); 1 ♀, Tazawako Lake, Sempoku-gun, Akita Prefecture, 19–VIII–1990, A. Tanikawa leg. (NSMT–Ar 4413); 1 ♀, Katashina-mura, Tone-gun, Gunma Prefecture, 3–5–VII–1981, A. Tanikawa leg. (NSMT–Ar 4414); 1 ♂, Yokozawa, Itsukaichi-shi, Tokyo, 17–V–1992, A. Tanikawa leg. (NSMT–Ar 4415); 1 ♀ 1 ♂, Shiroyama, Tsukui-gun, Kanagawa Prefecture, 13–V–1990, A. Tanikawa leg. (NSMT–Ar 4416); 1 ♂, Mt. Daiyuzan, Minamiashigara-shi, Kanagawa Prefecture, 26–V–1990, A. Tanikawa leg. (NSMT–Ar 4417); 1 ♀, Sugadaira, Sanada-machi, Nagano Prefecture, 22–VII–1984, Y. Hori leg. (NSMT–Ar 4418); 1 ♀, Hachioji-joshi, Hachioji-shi, Tokyo, 16–VII–1989, A. Tanikawa leg. (NSMT–Ar 4419); 1 ♂, Saragamine, Kamiukena-gun, Ehime Prefecture, 4–VI–1972, N. Tsurusaki leg. (NSMT–Ar 4420).

Other specimens examined. 96 ♀ 2 ♂ from Hokkaido, Akita, Fukushima, Ibaragi, Tochigi, Gunma, Tokyo, Kanagawa, Nagano, Mie, Hiroshima and Ehime Prefectures.

**Description.** Measurement (in mm). Total length ♀ 4.67–8.35, ♂ 3.36–4.70. Carapace length ♀ 1.69–2.83, ♂ 1.67–2.25; width ♀ 1.55–2.38, ♂ 1.53–1.94. Length of legs (1 ♀ from Nagano/1 ♂ from Kanagawa): I, 10.78/8.84; II, 10.12/7.70; III, 5.84/4.33; IV, 9.58/6.83. Abdomen length ♀ 3.13–5.59, ♂ 1.68–2.83; width ♀ 2.30–4.24, ♂ 1.12–1.77.

Female and male. Carapace length/width ♀ 1.09–1.24, ♂ 1.10–1.25. Median ocular area length/width ♀ 0.83–0.98, ♂ 0.90–0.95; anterior width/posterior width ♀ 0.85–1.04, ♂ 0.92–1.00. Chelicera with 4 promarginal and 3 retromarginal teeth. Labium length/width ♀ 0.67–0.77, ♂ 0.56–0.72. Sternum length/width ♀ 1.06–1.16, ♂



**Figs. 15–17.** *Eriophora sachalinensis* (S. Saito 1934) — 15, Male left palp, prolateral view (NSMT–Ar 4420); 16, epigynum, ventral view (NSMT–Ar 4418); 17, same, posterior view (NSMT–Ar 4418). (Scales: 0.25 mm.)



1.14–1.30. Length of leg I/length of carapace ♀ 3.66–3.81, ♂ 3.86–4.36. Male palp as in Fig. 15. Abdomen length/width ♀ 1.29–1.38, ♂ 1.28–1.60. Epigynum as in Figs. 16–17, all the female specimens examined, 101 individuals, with scape.

Coloration and markings in alcohol. Female and male. Carapace brown. Legs brown, with dark brown annulations. Abdomen greenish brown, mottled with black and pale yellow or white.

*Range.* Japan, Russia (Far East), China and Korea.

*Remarks.* It is necessary to compare the details of epigynum to separate females of *E. sachalinensis*, *E. aurea*, and *E. yanbaruensis* (see also remarks of *E. sagana*). The epigynum is widest at the frontal part in *E. sachalinensis* (Fig. 16), but widest at around the middle part in *E. yanbaruensis* (Fig. 23). The ratio of epigynal scape width to epigynum width is less than 1/2 in *E. sachalinensis* (Fig. 16), but more than 1/2 in *E. aurea* (Fig. 19). In male, the determination is much easier. In *E. sachalinensis*, the median apophysis is distally widened (Fig. 15), but those of the other three Japanese *Eriophora* species are distally narrowing (Figs. 12, 18, 22). As for the distinction between *E. aurea* and *E. yanbaruensis*, see remarks of them.

***Eriophora aurea* (S. Saito 1934), comb. nov.**

[Kinkatahari-onigumo]

(Figs. 8, 18–21)

*Argiope aurea* S. Saito 1934b, p. 316, pl. 13, fig. 20, pl. 15, fig. 63 (female holotype from Mt. Kurodake, Hokkaido, Japan, lost).

*Zilla aurea*: Ono 1975, p. 21; Shinkai & Takano 1984, p. 72; Yaginuma, 1986, p. 106; Chikuni 1989, pp. 75, 211, fig. 38.

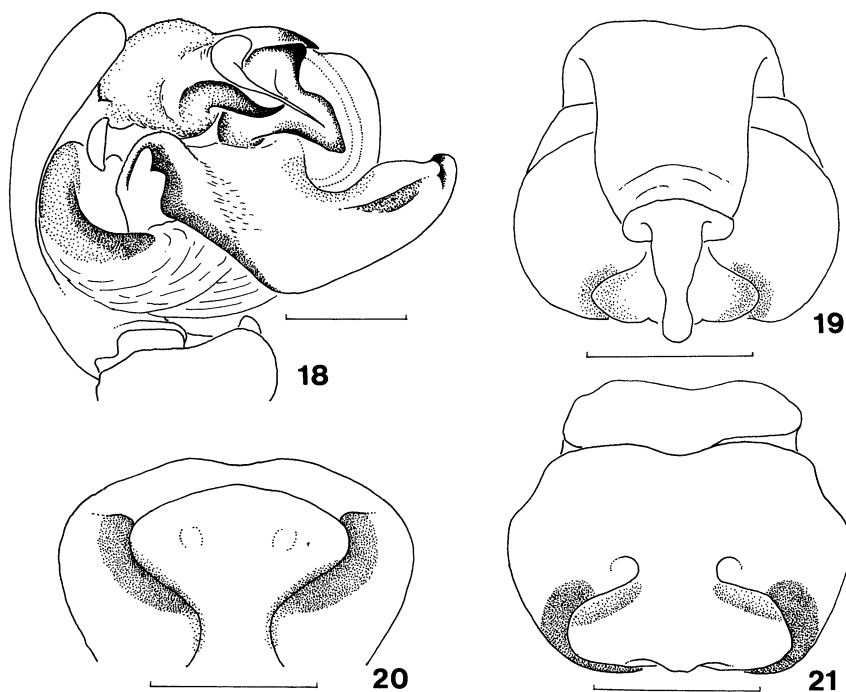
*Specimens examined.* Specimens measured. 1 ♂, Mt. Kitoushiyama, Rikubetsu-cho, Hokkaido, 10–VII–1993, K. Shibata leg. (NSMT–Ar 4421); 1 ♂, Mt. Higashi-nupukaushinupuri, Shikaoi-cho, Hokkaido, 2–VI–1999 (subadult), 5–VI–1999 (adult after breeding), M. Matsuda leg. (NSMT–Ar 4422); 1 ♂, Lake Shikaribetsu-ko, Shikaoi-cho, Hokkaido, 27–VII–1996, M. Matsuda leg. (NSMT–Ar 4424); 2 ♀, Hatomachi-toge Pass, Katashina-mura, Gunma Prefecture, 18–VIII–1980, A. Tanikawa leg. (NSMT–Ar 4423); 1 ♀, Mt. Nyugasayama, Suwa-gun, Nagano Prefecture, 23–VIII–1982, Y. Kusama leg. (NSMT–Ar 4425); 1 ♀, Kamikochi, Minamiazumi-gun, Nagano Prefecture, 14–VII–1976, K. Kumada leg. (NSMT–Ar 4426).

Other specimens examined. 5 ♀ from Hokkaido and Nagano Prefectures.

*Description.* Measurement (in mm). Total length ♀ 7.58–9.15, ♂ 4.00–4.10. Carapace length ♀ 2.67–3.96, ♂ 2.01–2.11; width ♀ 2.20–2.96, ♂ 1.73–1.84. Length of legs (1 ♀ from Nagano/1 ♂ from Hokkaido): I, 13.12/9.57; II, 11.89/8.36; III, 7.13/4.95; IV, 11.63/7.58. Abdomen length ♀ 5.59–6.15, ♂ 2.33–2.35; width ♀ 3.41–4.08, ♂ 1.70–1.73.

Female and male. Carapace length/width ♀ 1.18–1.34, ♂ 1.14–1.16. Median ocular area length/width ♀ 0.72–0.97, ♂ 0.83–0.98; anterior width/posterior width ♀ 1.11–1.21, ♂ 1.11–1.15. Chelicera with 4 promarginal and 3 retromarginal teeth. Labium length/width ♀ 0.70–0.79, ♂ 0.68–0.71. Sternum length/width ♀ 1.14–1.22, ♂ 1.15–1.16. Length of leg I/length of carapace ♀ 3.24–3.96, ♂ 4.36–4.54. Male palp as in Fig. 18. Abdomen length/width ♀ 1.41–1.68, ♂ 1.35–1.38, anteriorly with a pair of shoulder hump. Epigynum as in Figs. 19–21.

Coloration and markings in alcohol. Female and male. Carapace brown, head region darker. Legs brown, with dark brown annulations. Abdomen greenish brown, mottled with black and pale yellow or white.



**Figs. 18–21.** *Eriophora aurea* (S. Saito 1934) — 18, Male left palp, prolateral view (NSMT-Ar 4421); 19, epigynum, with scape (NSMT-Ar 4424); 20, same, posterior view (NSMT-Ar 4426); 21, same, scape torn off (NSMT-Ar 4426). (Scales: 0.25 mm.)

**Range.** Japan.

**Remarks.** As is mentioned in the remarks of *E. sachalinensis*, it is necessary to examine the details of the epigynum to determine the females of *E. sachalinensis*, *E. aurea*, and *E. yanbaruensis* (see also remarks of *E. sagana*). The ratio of epigynal scape to epigynum width is more than 1/2 in *E. aurea* (Fig. 19), but less than 1/2 in *E. sachalinensis* and *E. yanbaruensis* (Figs. 16, 23). As for the discriminating point of the male *E. aurea* from those of *E. sagana*, *E. sachalinensis*, and *E. yanbaruensis*, see remarks of them.

***Eriophora yanbaruensis* sp. nov.**

[Japanese name: Yanbaru-onigumo]

(Figs. 9–10, 22–25)

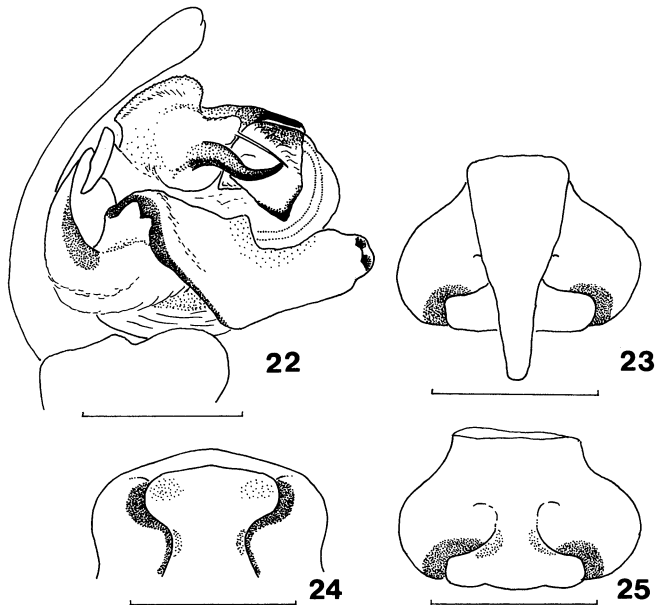
**Specimens examined.** Type series. Holotype: ♂, near Benoki Dam, Okinawajima Island, Okinawa Prefecture, Japan, 30-III-1997, A. Tanikawa leg. (NSMT-Ar 4427). Paratypes: 2 ♀ 1 ♂, Oku, Okinawajima Island, Okinawa Prefecture, 31-III-1997, A. Tanikawa leg. (NSMT-Ar 4428); 1 ♂, same data as the holotype (NSMT-Ar 4433); 1 ♂, Yona, Okinawajima Island, Okinawa Prefecture, 28-III-1997, A. Tanikawa leg. (NSMT-Ar 4429); 2 ♀, same locality, 8-IV-1998, T. Sasaki leg. (NSMT-Ar 4430); 1 ♀, Mt. Yonahadake, Okinawajima Island, Okinawa prefecture, 2-IV-1997, A. Tanikawa leg. (NSMT-Ar 4431); 1 ♂, U.S. Marine Corps Northern Training Area Section 11, Kunigami-son, Okinawajima Island, Okinawa Prefecture, 2-IV-1997, T. Sasaki leg. (NSMT-Ar 4432).

Other specimens examined. 20 ♀ 12 ♂ from Okinawajima Island, Okinawa Prefecture.

**Description** [based on the male holotype and one of female paratypes, variations among the type series are given in the parentheses]. Measurement (in mm). Total length ♀ 7.83 (5.76–8.08), ♂ 4.35 (4.18–4.95). Carapace length ♀ 2.69 (2.69–2.83), ♂ 2.00 (2.00–2.22); width ♀ 2.30 (2.27–2.37), ♂ 1.68 (1.68–1.86). Length of legs [female paratype/male holotype; tarsus + metatarsus + tibia + patella + femur = total]: I,  $0.97 + 2.47 + 2.47 + 1.37 + 3.13 = 10.41$  /  $0.90 + 2.23 + 2.37 + 1.07 + 2.83 = 9.40$ ; II,  $0.90 + 2.20 + 2.10 + 1.28 + 2.83 = 9.31$  /  $0.80 + 2.03 + 2.03 + 1.00 + 2.53 = 8.39$ ; III,  $0.67 + 1.13 + 1.07 + 0.87 + 1.73 = 5.47$  /  $0.55 + 0.97 + 0.87 + 0.60 + 1.53 = 4.52$ ; IV,  $0.80 + 2.20 + 1.92 + 1.20 + 2.73 = 8.85$  /  $0.70 + 1.87 + 1.68 + 0.80 + 2.25 = 7.30$ . Abdomen length ♀ 5.41 (3.84–5.56), ♂ 2.50 (2.33–2.80); width ♀ 3.71 (2.72–4.29), ♂ 1.75 (1.55–2.00).

Female and male. Carapace length/width ♀ 1.17 (1.17–1.23), ♂ 1.19 (1.17–1.22). Median ocular area length/width ♀ 0.93 (0.87–1.04), ♂ 0.84 (0.84–1.02); anterior width/posterior width ♀ 1.12 (0.94–1.12), ♂ 1.07 (1.00–1.07). Chelicera with 4 promarginal and 3 retromarginal teeth. Labium length/width ♀ 0.76 (0.70–0.79), ♂ 0.65 (0.60–0.78). Sternum length/width ♀ 1.15 (1.15–1.21), ♂ 1.22 (1.22–1.33). Length of leg I/length of carapace ♀ 3.87 (3.70–3.91), ♂ 4.70 (4.59–4.79). Male palp as in Figs. 22–25. Abdomen length/width ♀ 1.46 (1.29–1.58), ♂ 1.43 (1.37–1.50), anteriorly with a pair of shoulder hump. Epigynum as in Figs. 23–25.

Coloration and markings in alcohol. Female and male. Carapace brown, head region darker. Legs brown, with dark brown annulations. Abdomen greenish brown, mottled with black and pale yellow or white.



**Figs. 22–25.** *Eriophora yanbaruensis* sp. nov. — 22, Male left palp, prolateral view (NSMT-Ar 4427); 23, epigynum with scape, ventral view (NSMT-Ar 4428); 24, epigynum, posterior view (NSMT-Ar 4428); 25, epigynum, scape torn off, ventral view (NSMT-Ar 4428). (Scales: 0.25 mm.)

*Range.* Japan (Okinawajima).

*Remarks.* Cladistic analysis showed that *E. yanbaruensis* is a sister of the clade including *E. sagana*, *E. aurea* and *E. sachalinensis*. *Eriophora sachalinensis* is a sister of the clade including *E. sagana* and *E. aurea* (Fig. 1). In general appearance, *E. yanbaruensis* closely resembles *E. sachalinensis*. In female, it is necessary to examine the details of the epigynum to separate these species. The epigynum is widest at around the middle part in *E. yanbaruensis* (Fig. 23), but widest at the frontal part in *E. sachalinensis* (Fig. 16). In male, the median apophysis of *E. yanbaruensis* is distally become narrower (Fig. 22), but that of *E. sachalinensis* is widened (Fig. 15). *E. yanbaruensis* also resembles *E. aurea*. In female, the ratio of epigynal scape width to epigynum width is less than 1/2 in *E. yanbaruensis* (Fig. 23), but more than 1/2 in *E. aurea* (Fig. 19). In male, the terminal apophysis of *E. yanbaruensis* is like a fine thread (Fig. 22), but that of *E. aurea* is spiniform (Fig. 18).

*Etymology.* The specific name is derived from the native area of the species. Yanbaru means the northern part of Okinawajima Island.

#### Specimens examined for comparison

*Zilla diodia* (Walckenaer 1802): 1 ♀ 1 ♂, Asie Min. (MNHN: B2537, 14763); Many ♀, Algolia. (MNHN: B2519, 173); 1 ♂, Österreich-Stopfenreuth, Donauauen, Auwald und Ufervegetation, 2-VI-1993, P. Jäger leg. (Figs. 2-3, NSMT-Ar 3570); 1 ♀, Köln, Uniwiegen, HF, 5-V-1992, P. Jäger leg. (NSMT-Ar 3571).

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## Acta Arachnologica, Vol. 49, No. 1 掲載論文の和文要旨

### カタハリウズグモの生活史および隠れ帯二型の出現頻度の季節変化 (pp. 1-12)

渡部 健(〒606-8502 京都市左京区北白川追分町, 京都大学大学院理学研究科生物科学専攻動物生態学研究室)

京都大学理学部付属植物園内に生息するカタハリウズグモの生活史および、円網の隠れ帯二型(直線型・ウズ型)の出現頻度の季節変化を調査した。調査地内のカタハリウズグモは二化性で、夏世代と越冬世代をもっていた。産卵から幼体が出現するまでの時間は繁殖期間中に変化した。おそらく、卵発生における有効積算温度の効果によるものと推測された。卵囊中の卵数は、保護している雌親の体重、および推定される産卵前の雌親の体重と高い正の相関関係を示した。隠れ帯二型の出現頻度は季節変化し、初夏には直線型が多く、秋に向けてウズ型の頻度が増大する傾向を示した。直線帯をつけた網の個体は、ウズ帯をつけた網の個体に比べ、体重が重く、腹部の膨らみ度合いが大きかったことから、隠れ帯二型は、個体の栄養状態に対応していることが示唆された。初夏から秋に向けて餌となる飛翔昆虫量が減少することが、隠れ帯二型の出現頻度の季節変化に影響を与えていると推察した。

### 台湾産 *Nesticella* 属(クモ目: ホラヒメグモ科)の1新種 (pp. 13-16)

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台湾産ホラヒメグモ科 *Nesticella* Lehtinen & Saaristo 1980 属の1新種を記載した。この属はアジアからアフリカの熱帯地方に多く分布する。東アジアからは、*Nesticella quelpartensis* (Paik & Namkung 1969), *N. brevipes* (Yaginuma 1970), *N. mogera* (Yaginuma 1972), *N. okinawaensis* (Yaginuma 1979), *N. odonta* (Chen 1984) および *N. yui* Wunderlich & Song 1994 の

6種がこれまで記録されている (Platnick 1997; Song et al. 1999)。今回記載した種はこの地域からの7種目にあたる。

### 日本産 *Eriophora* 属のクモ類(クモ目: コガネグモ科) (pp. 17-28)

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分岐分析に基づいて、これまで *Zilla* 属に置かれていた日本産の3種のクモ類を *Eriophora* 属に移し、再記載し図示した。また、沖縄島産 *Eriophora* 属の1新種を記載した。本論文であつかったクモ類は、*Eriophora sagana* (Bösenberg & Strand 1906) comb. nov. サガオニグモ, *E. sachalinensis* (S. Saito 1934) comb. nov. カラフトオニグモ, *E. sachalinensis* (S. Saito 1934) comb. nov. キンカタハリオニグモおよび *E. yanbaruensis* sp. nov. ヤンバルオニグモ(新称)の4種である。*Aranea sagana* Bösenberg & Strand 1906 を *Aranea sagana* (Keyserling 1893) の新参ホモニムから復活させ、*Eriophora migra* Zhu & Song 1994 は *Eriophora sagana* (Bösenberg & Strand 1906) comb. nov. サガオニグモの、*Eriophora flava* Zhu & Song 1994 は *Eriophora sachalinensis* (S. Saito 1934) comb. nov. カラフトオニグモの新参シノニムとした。

### 沖縄島から採集された無眼の真洞穴性ヤチグモ属の1新種 (pp. 29-40)

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沖縄本島の石灰洞から見つかった小型の洞穴性ヤチグモを *Coelotes troglacaecus* n. sp. (オキナワホラアナヤチグモ) として記載した。ヤチグモでは国内初の無眼種である。同所的に生息する *Coelotes okinawensis* Shimojana 1989 オキナワヤチグモと比較しつつ形態記載をおこなっ